

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- 1 1. (Currently amended) A method for verifying type safety of an
2 application snapshot, the application snapshot including a state of an executing
3 program that is moved from a first computing device to a second computing
4 device across a network in order to continue execution on the second computing
5 device, the method comprising:
6 receiving the application snapshot of the executing program from the first
7 computing device on the second computing device, wherein the application
8 snapshot includes a subprogram, an operand stack, and a point of execution;
9 wherein the operand stack contains operands currently being operated on
10 by the executing subprogram;
11 examining the application snapshot on the second computing device to
12 identify the subprogram being executed and the point of execution within the
13 subprogram;
14 examining the subprogram on the second computing device to determine
15 an expected structure of the operand stack at the point of execution;
16 validating that the state of the application snapshot on the second
17 computing device is consistent with the expected structure of the operand stack;
18 verifying on the second computing device that variables and arguments
19 within the application snapshot are of the proper type; and
20 if the state of the application snapshot is validated as consistent with the
21 expected structure of the operand stack, resuming execution of the application

22 snapshot on the second computing device at the point of execution on the first
23 computing device;
24 wherein the expected structure of the operand stack includes a collective
25 size of entries and the types of entries expected on the operand stack at the point
26 of execution within the subprogram; and
27 wherein validating that the state of the application snapshot on the second
28 computing device is consistent with the expected structure of the operand stack
29 involves ensuring that the collective size of entries and the types of entries on the
30 operand stack agree with the collective size of entries and the types of entries
31 expected on the operand stack.

1 2. (Original) The method of claim 1, wherein examining the subprogram
2 to determine the expected structure of the operand stack at the point of execution
3 involves examining the subprogram with a code verifier, wherein the code verifier
4 ensures that:
5 the subprogram does not cause the operand stack to overflow and
6 underflow;
7 a use of a local variable does not violate type safety; and
8 an argument of an instruction is of an expected type.

1 3. (Original) The method of claim 1, wherein the operand stack contains at
2 least one local variable, at least one argument that is passed as a parameter to the
3 subprogram, and an offset to the point of execution within the subprogram.

1 4-6 (Canceled).

1 7. (Original) The method of claim 1, wherein resuming execution of the
2 application snapshot involves restarting the subprogram at the point of execution
3 within the second computing device.

1 8. (Currently amended) A computer-readable storage medium storing
2 instructions that when executed by a computer causes the computer to perform a
3 method for verifying type safety of an application snapshot, the application
4 snapshot including a state of an executing program that is moved from a first
5 computing device to a second computing device across a network in order to
6 continue execution on the second computing device, the method comprising:
7 receiving the application snapshot of the executing program from the first
8 computing device on the second computing device, wherein the application
9 snapshot includes a subprogram, an operand stack, and a point of execution;
10 examining the application snapshot on the second computing device to
11 identify the subprogram being executed and the point of execution within the
12 subprogram;
13 wherein the operand stack contains operands currently being operated on
14 by the executing subprogram;
15 examining the subprogram on the second computing device to determine
16 an expected structure of the operand stack at the point of execution;
17 validating that the state of the application snapshot on the second
18 computing device is consistent with the expected structure of the operand stack;
19 verifying on the second computing device that variables and arguments
20 within the application snapshot are of the proper type; and
21 if the state of the application snapshot is validated as consistent with the
22 expected structure of the operand stack, resuming execution of the application
23 snapshot on the second computing device at the point of execution from the first
24 computing device;

25 wherein the expected structure of the operand stack includes a collective
26 size of entries and the types of entries expected on the operand stack at the point
27 of execution within the subprogram; and
28 wherein validating that the state of the application snapshot on the second
29 computing device is consistent with the expected structure of the operand stack
30 involves ensuring that the collective size of entries and the types of entries on the
31 operand stack agree with the collective size of entries and the types of entries
32 expected on the operand stack.

1 9. (Original) The computer-readable storage medium of claim 8, wherein
2 examining the subprogram to determine the expected structure of the operand
3 stack at the point of execution involves examining the subprogram with a code
4 verifier, wherein the code verifier ensures that:

5 the subprogram does not cause the operand stack to overflow and
6 underflow;

7 a use of a local variable does not violate type safety; and

8 an argument of an instruction is of an expected type.

1 10. (Original) The computer-readable storage medium of claim 8, wherein
2 the operand stack contains at least one local variable, at least one argument that is
3 passed as a parameter to the subprogram, and an offset to the point of execution
4 within the subprogram.

1 11-13 (Canceled).

1 14. (Original) The computer-readable storage medium of claim 8, wherein
2 resuming execution of the application snapshot involves restarting the subprogram
3 at the point of execution within the second computing device.

1 15. (Currently amended) An apparatus that facilitates verifying type safety
2 of an application snapshot, the application snapshot including a state of an
3 executing program that is moved from a first computing device to a second
4 computing device across a network in order to continue execution on the second
5 computing device, comprising:
6 a receiving mechanism that is configured to receive the application
7 snapshot of the executing program from the first computing device on the second
8 computing device, wherein the application snapshot includes a subprogram, an
9 operand stack, and a point of execution;
10 wherein the operand stack contains operands currently being operated on
11 by the executing subprogram;
12 an examination mechanism that is configured to examine the application
13 snapshot on the second computing device to identify the subprogram being
14 executed and the point of execution within the subprogram wherein, the
15 examination mechanism is configured to also examine the subprogram to
16 determine an expected structure of the operand stack at the point of execution;
17 a validation mechanism that is configured to validate that the state of the
18 application snapshot on the second computing device is consistent with the
19 expected structure of the operand stack;
20 a verifying mechanism configured to verify on the second computing
21 device that variables and arguments within the application snapshot are of the
22 proper type; and
23 an execution mechanism that is configured to resume execution of the
24 application snapshot on the second computing device at the point of execution
25 from the first computing device if the state of the application snapshot is validated
26 | as consistent with the expected structure of the operand stack;

27 wherein the expected structure of the operand stack includes a collective
28 size of entries and the types of entries expected on the operand stack at the point
29 of execution within the subprogram; and
30 wherein validating that the state of the application snapshot on the second
31 computing device is consistent with the expected structure of the operand stack
32 involves ensuring that the collective size of entries and the types of entries on the
33 operand stack agree with the collective size of entries and the types of entries
34 expected on the operand stack.

1 16. (Original) The apparatus of claim 15, wherein the examination
2 mechanism includes a code verifier, wherein the code verifier is configured to
3 ensure that:
4 the subprogram does not cause the operand stack to overflow and
5 underflow;
6 a use of a local variable does not violate type safety; and
7 an argument of an instruction is of an expected type.

1 17. (Original) The apparatus of claim 15, wherein the operand stack
2 contains at least one local variable, at least one argument that is passed as a
3 parameter to the subprogram, and an offset to the point of execution within the
4 subprogram.

1 18-20 (Canceled).

1 21. (Original) The apparatus of claim 15, wherein in resuming execution
2 of the application snapshot, the execution mechanism is configured to restart the
3 subprogram at the point of execution within the second computing device.

1 22. (Previously presented) The method of claim 1, further comprising
2 restoring the state of an object within the application snapshot on the second
3 computing device by changing a pointer from an address of the object on the first
4 computing device to an address of the object on the second computing device.

1 23. (Previously presented) The computer-readable storage medium of
2 claim 8, further comprising restoring the state of an object within the application
3 snapshot on the second computing device by changing a pointer from an address
4 of the object on the first computing device to an address of the object on the
5 second computing device.

1 24. (Previously presented) The apparatus of claim 15, further comprising
2 an object restoring mechanism that is configured to restore the state of an object
3 within the application snapshot on the second computing device by changing a
4 pointer from an address of the object on the first computing device to an address
5 of the object on the second computing device.